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ABSTRACT

Presented is the argument that museums currently have a greater need for formative than for summative evaluation. Areas of formative evaluation that are of primary concern are also discussed. (Author/SA)

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ADVANCING EDUCATION THROUGH SCIENCE-ORIENTED PROGRAMS , Report PSc-19

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INFORMED DECISION MAKING
(Evaluation You Can Use)

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INFORMED DECISION MAKING
(Evaluation You Can Use)

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Evaluation has gained a rather unenviable reputation. Just mention the word and defenses rise to the occasion. Some negativism undoubtedly stems from a feeling that evaluation will be destructive and discouraging. One often hears, "It's easier to criticize than create". Many program developers explain that they already have a large supply of criticism, "Just attend a staff meeting and see for yourself how critical everyone is!" A very common note is: "We don't have time (or money) for evaluation". As a result, evaluation is a small and often non-existent element in programs of institutions concerned with informal education.

When evaluation is carried out, it's usually of exhibits that are completed and cannot be changed. Evaluation of the effect of a completed exhibit is often called summative evaluation. While summative evaluation has value, it is of no use in improving an exhibit. At Lawrence Hall of Science we have been developing a model for evaluation which results in improvement of exhibits and programs <u>during their development</u>. This type of evaluation is often called formative. In this paper we will argue that museums currently have a greater need for formative than for summative evaluation, and we will suggest which areas of formative evaluation are of primary concern.

The major task in formative evaluation is to select questions that need to be answered and to develop methods to answer these questions. Museum evaluation should be used to improve the programs, exhibits, and products so that they serve the target population better. The users of evaluation information are program and exhibit planners and developers. They need information which will increase the likelihood that they will make effective decisions. The evaluator will be most effective when working in the program from the early planning stages as a member of the exhibit development team.

The most well known evaluation studies have been done by educational psychologists concerned with evaluation of curricula in schools, industry, the military or other institutions concerned with formal education. The major question in well known studies has been summative: whether users of a particular program learn more than users of another program. These educational horseraces have frequently been inconclusive for many reasons including:

1) the difficulty of setting up truly controlled experiments in the real world of schools, and

2) the difficulty of comparing programs which have different goals (e.g. "to have children grow plants" vs. "show children that plants grow better when they have plant food").

Formative evaluation is, of course, used in development of many educational programs, but it is not so well publicized as summative evaluation. After all, educational consumers making decisions about which program to use are likely to be influenced by summative evaluation. On the other hand, the program will be greatly enhanced by formative evaluation.

EVALUATION IN THE MUSEUM OR SCIENCE CENTER

It is tempting to focus evaluation in museums and science and technology centers on what users learn. Most currently available studies of museums have been summative (Lakoda 1975; Screven, 1975), although Shettle (1975) has reported on a very useful formative study.

While educational goals are important, it is imperative that the museums focus on exhibit characteristics and user interests as well. Museums are concerned with how to bring visitors back while schools have a captive audience. What we need to know at the beginning is how to attract and how to interest visitors. Only after we have the visitors' attention can we hope to teach them something. Museum visitors are not obliged to come, usually stay for at most two hours, and can choose what they want to do.

Formative evaluation also makes sense. Development staff for successful public programs such as Disneyland are very responsive to visitor feedback. Public schools, of course, have not been as directly concerned with immediate user satisfaction for many reasons including the need to impart knowledge. With the current decline in the school population, and dearth of educational funds, schools may well increase their emphasis on user satisfaction. The school model rather than the Disneyland model appears to have influenced museums and science centers. For instance, most museum classes take place in classrooms with a great deal of teacher talk. Like school, museum programs are frequently difficult for the users to understand and liberally supplied with "facts"; user enjoyment is not high priority.

We could all learn from the Disneyland model. In developing science center programs there are all sorts of terrific opportunities to make choices. The amount of visitor participation, type of graphics, exhibit grouping, and many other activity characteristics are flexible. Evaluation can be used to help the center staff make these decisions to attract and keep visitors.

Why have museums avoided formative evaluation? Major reasons are time and money. Many programs never reach the revision stage so there is no opportunity to use information from evaluation. There is also the curator syndrome: exhibits are designed to appeal to other curators, not the museum visitors. Naturally these exhibits are incomprehensible to the general public. There is also a feeling that museums know what users need, even though it's not what they want. Again schools have traditionally been viewed as places which provide what is needed - and somehow it's better if it's a bit unpleasant to get what is needed. The "take it or leave it" attitude is hardly appropriate when serving voluntary visitors to museums.

INFORMED DECISION MAKING

Our model of evaluation is called "Informed Decision Making". In this system, the evaluator first helps to create choices and then gathers evidence so that a reasonable decision can be made.

Creating Choices

The evaluator can help exhibit developers by identifying choices that they are making or that could be made. One area where choices might be created is the learning environment. Possible environments range from traditional classrooms to total entertainment. By installing a predominantly graphic exhibit, the exhibit developer has chosen not to install a participatory

exhibit. The evaluator, involved in early exhibit planning, might create choices by interviewing a few visitors about their preference for graphics. Sometimes the invitation to consider other ways to handle a particular situation is useful. Just thinking about new possibilities can create choices.

Another tool used by evaluators is to relate research findings in psychology and education to the questions faced by exhibit developers (See, for example, Thier and Linn, 1976).

One technique which is particularly useful for creating choices in the museum environment is systematic observation. At LHS we have used photographs to get an idea about how visitors respond to our environment. (See Figures 1-4). Our visitors come in all sizes, shapes, and ages, and some of them are not stimulated by our program. Failure to serve a particular group constitutes a choice, and we should be aware of it. It is a common observation in science centers that younger children love buttons. Unfortunately, we rarely capitalize on this fascination. We observe that our many family groups engage in more verbal interaction than do same age visitor groups. These observations are but a few of those which can aid us in understanding the choices we make when we install exhibits.

Making Choices

The second function of the evaluator assisting in Informed Decision Making is to gather evidence to help exhibit planners to decide between the choices that have been created. Feedback is needed to make reasonable decisions. The techniques of curriculum evaluation, education, and psychology can be relevant in this process. The most common approach is visitor interviews. Choosing the right questions is actually not easy, but can be

learned through experience.

This evaluation model is illustrated in the development of a participatory Astronomy Exhibit at LHS. This recently opened exhibit, developed by Alan Friedman and LHS staff, funded in part by the National Science Foundation, and a gift from William K. Holt, has been in development for almost two years. Description of the advantages of formative evaluation for the development of this exhibit is described in the accompanying article: "Star Games: The Pains and Pleasures of Formative Evaluation" (Eason and Friedman).

As you might have anticipated after the development phase, once the astronomy exhibit was open to the public, the developers wanted to know if people learned while doing the activities. This question is still in the area of formative evaluation especially since it is possible to change many aspects of the exhibits.

There are various ways to measure exhibit effectiveness:

1) A common method to assess exhibit effectiveness is to measure popularity. This is far from a simple question. It can be measured in terms of number of users, number of return visits, likelihood of being remembered or many other ways. Our observations indicate that popularity should also be evaluated in terms of who the users are. We have found that some exhibits are popular with one group, and actively disliked by another.

2) Another way to measure exhibit effectiveness is the length of time visitors spend at the exhibit. Clearly it would be impossible to learn from an exhibit if you didn't visit it, and probably the learning potential for an exhibit is closely related to the time spent at the exhibit. Observation at LHS indicates that users spend more time on exhibits that have a greater participatory potential. For this reason alone, participatory exhibits are likely to result in greater learning than non-participatory exhibits.

3) A third method of measuring effectiveness is whether an exhibit generates interest in science. In the case of the astronomy exhibit, we asked LHS school group visitors to indicate which of 3 posters they would like to have if they won a raffle. School groups who had been randomly selected to see the astronomy exhibit were compared to groups who had not seen the exhibit (before the exhibit was open to the public). Of the visitors who had seen the exhibit, 68% chose the astronomy poster, versus 46% of the control group.

4) A fourth kind of evidence comes from visitor answers to multiple choice questions about astronomy.

   This has a major drawback: it's likely to show that visitors haven't learned anything because:

   a) it's difficult to design good questions.

   b) the mode of learning was participatory, and the mode of responding is pencil and paper.

   c) visitors really might not have learned anything about the questions, but might rush out and buy six books on astronomy or tell ten of their friends: "You've got to see the astronomy exhibit at LHS".

But everyone always wants to ask multiple choice questions, so if you can't resist, here are some guidelines:

   a) Visitors rarely are willing to answer more than four questions, so after their age and sex you are left with two questions.

   b) Two questions are fine, just don't give every visitor the same question. You can have a group of 20 questions and make 10 different questionnaires.

   c) It's not necessary to ask more than 30 subjects from one category the same question. If this does not yield at least a trend in favor of your program, change the questions, exhibit, or something.

   d) To compare visitors who have seen an exhibit with those who have not, give half of them the questions before they view and half after they view.

5) A fifth and very important kind of evidence is a participatory interview. For the astronomy exhibit, we might ask visitors to "Focus the telescope on Saturn", and determine how long it takes them to succeed. This is better than a multiple choice question because it's in the same mode as the exhibit. Rather than transferring information from a participatory mode to a written mode, the skills presented in the exhibit are assessed.

In assessing exhibit effectiveness, it is our recommendation that as many different kinds of evidence as possible be gathered. Even if each bit of evidence is questionable in some way, if the program is effective, the total evaluation picture will describe it.

Inevitably, when this approach is taken some information is inconsistent with other information. This is also of interest. Sometimes attempts to reconcile such inconsistencies result in great increases in understanding. Sometimes one is left with reporting the inconsistencies and waiting for more information. For instance, a study at LHS indicated that some children loved an exhibit while others found it boring. More detailed analysis may indicate that length of exposure to the exhibit, age, previous science courses or some other variable explains this finding.

Providing the Informed Decision Making model for exhibit developers at LHS has had an important effect: they have learned to do formative evaluation. One reason that evaluation has enjoyed such a positive reception is clearly that it has worked: exhibits have been improved substantially as the result of formative trials. Also, we have learned alot about who our users are and how to attract more of them. Finally, the director has vociferously supported formative evaluation. Administrative support is essential for implementation of formative evaluation techniques. Staff members attuned to formative evaluation learn to: 1) value visitor feedback, 2) admit that they don't know the answers and try a particular exhibit two different ways to see which is best, and 3) look for choices rather than answers.

COSTS OF INFORMED DECISION MAKING

It is, of course, difficult to assign an actual cost to an improved exhibit. Nevertheless, the quality of an exhibit is important to draw and keep visitors. How do we know that formative evaluation is cost effective?

One way to assess this is to look at the costs of the evaluation. When an in-house evaluator in conjunction with the project staff carries out the evaluation, the actual added cost is the evaluator's salary. Staff time spent in evaluation is also a cost of the evaluation. But an efficient evaluation might actually save staff time by reliably and objectively answering critical questions. Hiring outside evaluation teams is usually expensive and may not result in as much staff participation and staff learning as having a staff evaluator. It should be noted that outside evaluators have a very definite and worthwhile role as unbiased observers and are often considered to be necessary for summative studies.

CONCLUSIONS

Formative evaluation is a valuable tool when used effectively by exhibit development teams. The Informed Decision Making model has proved effective as a formative evaluation technique. In this approach the evaluator first creates choices and then gathers evidence to determine the best choice. By creating choices in conjunction with the project staff, the evaluator is sure to work on problems of interest to the museum. By gathering evidence from observing actual museum visitors, the evaluator can help make the museum programs more relevant and comprehensible to the audience.

Although the problem is complicated, as our understanding of the museum learning environment grows, our ability to design better exhibits will also increase. While summative evaluation questions about the learning potential in a museum are important, it is clear that learning is more likely to take place when exhibits are designed to suit the users. Museums succeed when visitors return -- visitors return when they enjoy their experiences.

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FIGURE CAPTIONS:

1. Family groups often interact with exhibits - one member may adopt a teaching role.
2. Visitors come in many sizes.
3. The LHS computer exhibit is very popular.
4. This exhibit does not interest the whole visitor group.